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# Creating Innovation Systems through Virtual Communities

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# Creating a Virtual Innovation System in Second Life

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## Abstract

The current rationale is that geographic regions provide the best context for innovation systems to emerge and thrive because of localized learning processes and the need to transfer “sticky” knowledge through social interaction. The core idea is that innovative activity relies upon an entire system composed of a variety of institutions and infrastructures interacting to create a learning-conducive environment that is geographically bound. The benefits associated with establishing regional innovation systems is that physical proximity facilitates the necessary underlying social capital essential for the creation of new intellectual capital. However, this concept of promoting innovation by restricting researcher and private firm mobility to specific geographic regions has real limitations, for instance, there may not be enough developed land, housing or amenities to attract the top scientists and organizations to a specific region. This begs the question, can regional innovation systems designed in a virtual world generate the same dynamics? In this paper, we consider whether the term “regional” in the sense of innovation systems is limited to geographic proximity in the real world, or whether or not this concept extends to geographic proximity in a *virtual world*. The purpose of this paper is to present our design ideas about how to create a virtual regional innovation system in the virtual world Second Life. We base our community design on the theoretical foundation underlying the primary and support activities of innovation systems. We then present our ideas about how these activities may be translated to a virtual community. We end with a discussion of why this research is relevant in terms of both practice and research.

**Keywords:** innovation systems, Second Life, online communities, virtual communities, clusters initiatives, social networks

## Introduction

Recent advances in information and communication technologies (ICT) are creating new possibilities for value creation and innovation through networked forms of organization, such as online product and service markets ([elance.com](http://elance.com), [innocentive.com](http://innocentive.com)), social networking sites ([facebook.com](http://facebook.com), [myspace](http://myspace.com), [LinkedIn](http://LinkedIn.com)), and online economies and metaverses ([secondlife.com](http://secondlife.com)). Given the incredible success of these virtual communities, a key issue faced not only by organizations, but also by nations, is how to leverage virtual communities to support the creation of new innovations and bring those innovations to market. The purpose of this paper is to present our initial ideas about how to create a virtual community that supports specific business outcomes. Essentially, we are presenting our “proof of concept” for the design of a virtual regional innovation system based on a virtual community. Creating a virtual community presents a significant challenge, since policymakers and managers alike are finding that networks cannot be “managed” using traditional organizational tools and strategies. In contrast to centralized organizational structures that bureaucratize information and resource flows; networks, and especially virtual communities, are complex, organic forms of organization that seem to resist formally mandated initiatives. They result from individuals interacting through informal, emergent relationships based on intrinsic motivations and passions around a shared interest or practice, impelled by personal biases and preferences for others as opposed to anything dictated by a formal organization.

The purpose of this paper is to present our research agenda exploring economic value creation in the support of innovation in “Real Life” by building a virtual innovation system (VIS) in the online community “Second Life”. The VIS created in Second Life will be modeled after a real life “regional innovation system” (RIS). The primary activities will occur in Second Life, but will be conducted by real life researchers, government organizations and businesses to create value and innovations that can be developed in real life. The key research question underlying this overarching project is “if we build it, will they come”? Our proposed research agenda is organized as follows. In the following section, we model our VIS on the theoretical foundation underlying regional innovation systems to identify the primary activities that should be at the core of our VIS community. We then integrate theories of social capital to identify the secondary activities that are essential for sustaining the community and ensuring the success of the primary activities. This is followed by an overview of our VIS community design, which will consist of a region or private island in the virtual world, Second Life. We describe the development of specific activities related to the primary activities of the innovations model, and how different information and communication technologies facilitate the primary and support activities. We conclude with a discussion of our project plan and potential implications of this research.

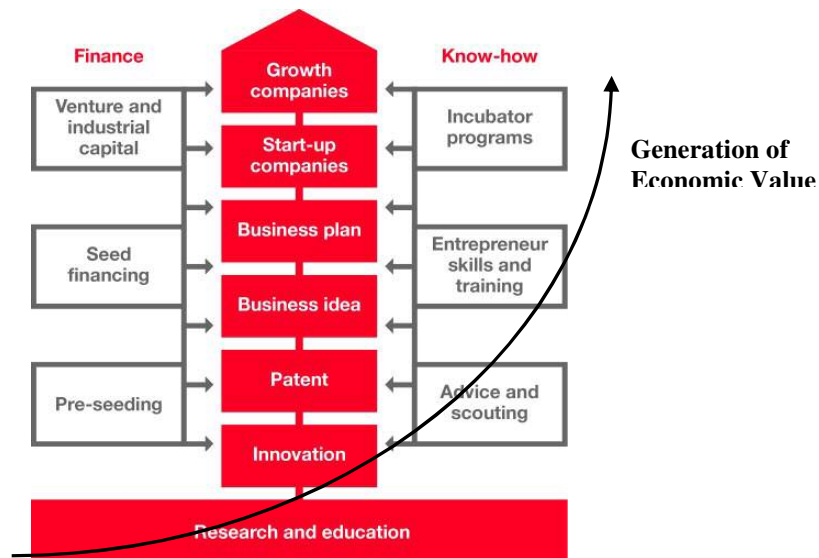
## Theoretical Foundation – The Regional Innovation Systems Model

Since the early 1990s the regional innovation system concept has become widely circulated and used in both academic as well as in policy circles. A regional innovation (RIS) is defined as “interacting knowledge generation and exploitation subsystems linked to global, national and other regional systems” (Cooke 2004, p. 3). In principle, an RIS connects across several sectors in a regional economy, given that firms and knowledge-based organizations interact systematically and consistently (Asheim and Coenen 2005). The work on RIS is based on four broad assertions. First, in today’s knowledge-based economy, the ability to innovate is more important than cost efficiency in determining the long-term ability of firms to prosper. Second, innovations predominantly occur as a result of interactions between various actors, rather than as a result of a solitary genius (Von Hippel 1988). This fits with a Schumpeterian view of innovations as new combinations of already existing knowledge, ideas, and artifacts (Schumpeter 1949). Third, and this is where “geography” enters the picture, there are a number of reasons why interactive learning and innovation processes are not space-less or global, but on the contrary unfold in a way where geographical space plays an active role. Fourth, an implication of the above is that there are reasons to believe that the knowledge structures of a given geographical territory are more important than other characteristics, such as general factor supply, production costs, etc., when it comes to determining where we should expect economic growth and prosperity in today’s world economy (Malmberg and Maskell 2002).

### *The Primary Activities in the Innovation Systems Model*

The core idea is that innovative activity relies upon an entire system, composed of a variety of institutions and infrastructures interacting to create a learning-conducive environment that is geographically bound. These innovation systems are characterized by a continuous “upward spiral” resulting from the interactions and mobility between networks of firms and research institutions throughout the activities of research, development, production, and diffusion. The trilateral relationships among firms, government and universities working together within an emergent pattern of linkages (the “Triple Helix”) are central to the success of regional innovation systems (Ektowitz 2003). RIS are characterized by a high degree of social capital that provides access to resources necessary for survival and growth such as financial support, a commercial mindset, talent, know-how, and legitimacy. The value created through synergies among network participants significantly impacts the ability to sustainably innovate and turn research into commercially viable products and services in an ever changing and highly competitive environment.

As the basis for the design of our virtual community, we adapt the innovation systems model developed in the RIS initiative, the Uppsala BIO Life Science Initiative, located in Uppsala, Sweden (Teigland et al. 2006). The primary activities consist of a chain of support for business ideas (figure 1), and includes the transfer of knowledge from research institutions, scientists and universities (right-hand side of the figure) and the possibility of financing (left-hand side) at each stage of a “value chain”, through incentives and a support infrastructure established by government entities (the center of the figure).



**Figure 1.** Theoretical Model Identifying the Primary Activities of a Regional Innovation System

The goal of the innovation system is to develop a complete, unbroken chain of support for business projects, from a professional and thorough analysis of their potential to a stage where they can be valued and commercialized (as either a new company, a project within an existing company, or out-licensing). There are six primary activities: innovation (the search for new ideas and discoveries), patent (helping establish ownership of innovations), business idea (investigating the market viability of an innovation), business plan (turning innovation into a concrete business model), start-up companies (establishing a firm to commercialize the innovation) and growth companies (attracting MNC support for the innovation). Initial ideas for an innovation may emerge from research or from private individuals, or they may be ideas or projects which cannot be supported within local industry. Individuals with business ideas and entrepreneurial ambitions should then be directed to an appropriate instance of support and advice to develop their idea.

### *The Secondary Activities in the Innovation Systems Model*

In order for the RIS to succeed and the primary activities to thrive, an RIS must engage in the support activities associated with generating social capital. Social capital is defined as “the sum of the actual and potential resources embedded within, available through and derived from the network of relationships possessed by an individual or social unit (Nahapiet

and Ghoshal 1998 p. 243). In contrast to financial capital or human capital, social capital is embedded in the relationships among actors. Nahapiet and Ghoshal (1998) identify three key dimensions of social capital. The first is structural capital, which reflects the actual pattern or structure of relationships among actors in a network. The second dimension is cognitive capital which is reflective of the unique shared languages, narratives and codes of the collective. The third dimension of social capital is relational capital, consisting of shared norms, values, and identity, as well as feelings of trust, obligation and commitment. In order for the primary activities associated with the RIS value creation to thrive, a RIS must have high levels of structural capital, or linkages among actors. Members of the RIS must have a shared language and common means of understanding discourse, which is why the RIS focus on a specific industry cluster is vital. Finally, a RIS must be characterized by high levels of relational social capital, consisting of trust in other actors, norms for guiding behavior and a shared identity about the goals of the RIS.

The current rationale is that geographic regions provide the best context for innovation systems to emerge and thrive because spatial proximity facilitates the creation of social capital to facilitate localized learning processes and the need to transfer “sticky” knowledge through social interaction (Asheim and Coenen 2005). Spatial proximity carries with it, among other things, the potential for intensified face-to-face interactions, short cognitive distance, common language, trustful relations between various actors, easy observations, and immediate comparisons (Malmberg and Maskell 2002). In short, spatial proximity seems to enhance the processes of interactive learning and innovation; therefore, RIS should be assumed to have a distinctly localized component. Much of the extant literature on regional innovation systems and clusters tends to focus on formal interactions between actors; however, there is increasing evidence of the importance of informal interactions as well. For example, Saxenian (1996) proposes in a well known study that one of the primary reasons for the relative success of the Silicon Valley area over that of Route 128 in Boston is that knowledge is easily shared through informal relationships between individuals belonging to competing firms as well as other organizations in the Silicon Valley region. This is in direct contrast to the Route 128 area in Boston where informal inter-organizational fraternization was discouraged.

## Research Design – Creating a Virtual RIS Community in Second Life

However, although RIS are identified as essential building blocks of a knowledge based economy, this concept of promoting innovation by restricting researcher and private firm mobility to specific geographic regions is antithetical to the rapid development of virtual communities. Therefore, we wondered whether the term “regional” in the sense of innovation systems is limited to geographic proximity in the real world, or whether or not this concept extends to geographic proximity in a *virtual world*. The benefits associated with establishing regional innovation systems is that physical proximity facilitates the necessary underlying social capital essential to the creation of new intellectual capital. But this begs the question, can regional innovation systems designed in a virtual world generate the same dynamics? Prior research on online communities suggests that the interactions in these communities create significant amounts of social capital and feelings of solidarity that facilitate online interactions. Next generation internet technologies, such as Second Life, extend interactions in online communities from text-based to 3-D representations. This provides the technical ability to create the illusion of a virtual region, where the same dynamics of same time, same place interactions occur. This in essence provides the online experience of a shared “region”, but one that is virtual - where members can participate regardless of their global, physical presence. Combining this sense of shared virtual space with the online dynamics that generate social capital, we seek to explore the possibilities of developing a virtual innovation system (VIS) that would serve the same purposes as a regional innovation system but without the geographic constraints.

Our proposal is to build a VIS modeled on the above framework and our experiences in the real world, in the virtual world, Second Life ([www.secondlife.com](http://www.secondlife.com)). Second Life is a three dimensional metaverse that is visualized graphically, where individuals are represented by avatars, and interact with other avatars and their environment (see figure 2). Second Life’s virtual world has seen exponential growth over the last year both in terms of membership and economic activity. This success is due in large part with the fundamental design principle that all user created content in Second Life remains the intellectual property of the creator, and is protected as all other forms of intellectual property. This has generated a dynamic and growing market for goods and services in Second Life, such as clothing and accessories for the Avatars, buildings and home furnishings for Avatars’ property, and transportation vehicles to name a few (see the website [www.slboutique.com](http://www.slboutique.com) for insights on the types of items being developed and sold). Second Life has its own currency, the Linden Dollar, which is the primary currency used to purchase Second Life items. However, Linden Dollars are exchangeable to US Dollars (appx. \$270L = \$1US), and in December, 2006, more than \$1,000,000 US were cashed out.

The owners of Second Life make money on this venture by selling property in Second Life. The virtual world design concept is based on geographic space – avatars have to travel in Second Life essentially in the same fashion as we travel in the real world (although your avatar can fly and some teleporting is possible), and you interact with other avatars in this virtual world – you are not simply online shopping, but in a store with sales reps and other avatars.



**Figure 2.** The 3-D virtual community Second Life ([www.secondlife.com](http://www.secondlife.com))

Currently, major ICT corporations including Sun Microsystems, Dell, HP, Cisco, Oracle, Accenture and IBM have all staked a claim in Second Life. For instance, Sun launched its Sun Pavilion in Second Life, featuring interactive kiosks and an outdoor theater where an avatar representing Sun's chief researcher, John Gage, held a press conference. IBM has purchased 24 Second Life islands (when viewed from above it forms their logo), more than 3,000 IBM employees have acquired avatars in Second Life, and about 300 routinely use it to conduct company business. IBM has used one of its islands to set up a virtual store for retailer Circuit City where avatars can move furniture around to find best placements for their electronics at home. On Dell island, an avatar can fly through a gigantic digital version of the Dell SP700, a computer geared at the gaming market. Cisco has built an eight-room house to showcase its networking products, and its research unit holds team meetings in Second Life, bringing together globally dispersed project teams.

Second Life has also emerged as one of the cutting-edge platforms for online education, having sold more than 100 islands for educational purposes including institutions such as Harvard, Pepperdine and New York University. The senior editor of the Harvard Business Review gave a talk on marketing in Second Life, in Second Life. Reuters has established a news agency to report on events in Second Life. Sweden has opened an embassy in Second Life, and the United States "Capitol Hill Island" was unveiled earlier this year. Toyota sells cars in Second Life and clothing designer American Apparel sells virtual pairs of jeans.

Our proposal is to purchase a private island in Second Life to establish a VIS enabling a global network of scientists the opportunities of a real world RIS. We propose to build a campus where scientists from different disciplines may come to brainstorm and develop new products and services, entrepreneurs can receive help writing business plans and present their ideas to venture capitalists, companies may advertise projects and/or positions, individuals can receive mentoring, etc. This campus will consist of buildings dedicated to each of the primary activities in the RIS model: innovation, patent, business idea, business plan, start-up companies and growth companies.

In addition, we will develop tools designed to ensure that the above primary activities are sustained by investing in support activities to create social capital, which is essential for regional innovations systems to thrive. These support activities will promote the creation of research communities based on trust, shared identity, norms, values and language, and social incentives for active participation. For example, we can offer services akin to linkedin, where scientists may actively post personal profiles and network with others. We can create virtual sports venues, such as a golf course or soccer field, to encourage socializing and teamwork.

## From Design to Reality

We need to better understand the manner in which ICT may mediate and transform innovation practice to facilitate novel modes of collaboration and integration that extend across time-space. By developing a VIS community, the dynamics underlying the creation and spread of innovations can be observed and archived, creating a fascinating new avenue for innovation-based research. By building a VIS that combines the primary activities focused on knowledge discovery and the

commercial application of ideas, with the support activities to foster strong community ties, we propose that this project has the potential to develop a truly effective means for a region or nation to achieve its vision of establishing itself as an acknowledged leader in training researchers to underpin its knowledge based economy. We have designed our project to unfold across four phases, describing in each phase the potential role of ICT to support primary and support activities.

**Phase I** - We will focus on the design and development of the online community. We will focus our efforts in phase I to design collaborative meetings spaces (e.g. separate buildings with a nice outdoor quadrangle) aligned with our first three primary activities: innovation, patents and business ideas, geared toward the science community (the right-hand side of the RIS model). We can conduct a preliminary survey of the region's scientist community to identify key gaps that they currently encounter in their work practices. We will build the content and services of the primary activities in the VIS campus around these gaps in knowledge not addressed by current networks of practice to create intrinsic value for participating in the VIS. The key activities in each of the buildings would be to encourage collaboration among the global network of the region's scientists to seek advice and inspirations around their innovations. Potential ideas include having a library in each building housing collections of documents relative to each primary activity. This would be akin to a document repository system where scientists could research current innovations and best practices in each of the primary activity areas. Another potential technique would be to create a social networking system, akin to linkedin or myspace, where scientists could create profiles, communicate and post their scientific endeavors. A third possibility is to create a shared wikipedia, where scientists could post their ideas and receive peer feedback and reviews at the initial stages of the innovation cycle. A fourth possibility is to offer support identifying grant opportunities and preparing proposals to ensure funding for innovative ideas.

**Phase II** - The second phase will consist of monitoring VIS activities and making changes as dictated by community members. The important issue for the success of phase II and the following phases is creating a critical mass of active and resourceful scientists engaged in the VIS. We will focus on creating the critical mass in the early stages of the primary activities: innovation and idea generation, patenting innovations and developing business ideas. Also during phase 2, we will develop performance metrics to assess the region's return on investment related to the activities in the VIS community.

**Phase III** - Once the community of scientists is established, the third phase will focus on building industry-research partnerships in the VIS. The important issue for the success of phase III is ensuring the ongoing financial investments in scientific research and development from the private sector, helping to commercialize new ideas and innovations. We will expand our campus by adding buildings for the remaining 3 primary activities: business plan, start-up companies and growth companies. Having a strong, private industry presence in the VIS is essential for ensuring a thriving innovation system to provide financial support and assistance in the commercialization of ideas (the left-hand side of the RIS model). Potential functionality includes helping scientists develop business plans for commercializing their innovations. We could build a facility focused on employment opportunities such as creating a system similar to monster.com where SMEs and MNCs could recruit talented scientists, or we could provide a service to educate scientists about potential opportunities in the region to encourage expatriates to return home. An essential functionality that needs to be introduced in Phase III is the creation of an online marketplace for the exchange of intellectual capital, akin to the online services markets elance.com and innocentive.com. Like an Ebay for services, companies would be able to post research and development projects that are either short-term or too costly to develop in-house, and outsource these projects to the scientists with already established lab space and resources. The marketplace could also include grant writing and business plan development services, web-design and development services, and Second Life services (such as creating new lab space or other virtual spaces).

**Phase IV** - The fourth phase will focus on leveraging the VIS community to promote innovations in education (the base of the innovation systems model). Having recruited the best graduate students to the region's universities, these individuals must then be provided with challenging and stimulating postgraduate training. This phase of the project will focus on ways that the Second Life region could be used for improving postgraduate training and to foster inter-disciplinary dialogue. We plan to build an online lecture hall and host classes by bringing in the top scientists globally to deliver lectures. We could also offer mentoring services, connecting promising young scientists with established researchers in the field. By integrating the Second Life experience in the education of future scientists, the region would be able to create the next wave of active participants in the VIS. The key advantage is that through their education, participating in a VIS community will seem obvious and easy to the next generation of researchers.

## Potential Implications of this Research

The potential benefits to the real life organizations that participate in a virtual innovation system are threefold. First, by using a VIS established in Second Life, a real life network of organizations can capitalize on a global network of scientists and stakeholders to convert ideas into viable commercial innovations, and leverage that value for the physical organizations.

In essence, this allows scientists to pursue the best opportunities in the global economy, at the same time return some of that value to the sponsoring organizations in the form of shared intellectual capital. Second, by creating a VIS community in Second Life, real life organizations expose their computer programmers and systems designers to cutting edge technologies. It is predicted that the future of the internet will be the replication of 3-D virtual space. No longer will individuals search Amazon.com from their desktops in isolation – rather shoppers will congregate in a virtual store, where they can see and interact with other shoppers akin to a real world shopping experience. Companies can test-market their products and services in Second Life prior to launch in real life. For instance, by seeing how avatars respond to certain features and functionalities of a virtual car automakers are better able to refine car designs to reflect market interests (or clothes, jewelry, hairstyles etc.). The real life organizations participating in the VIS will be at the forefront of this change and identified as key innovators in the development of the 3-D web. Third, by creating a VIS, participating organizations will have a first-mover advantage on this concept, increasing reputation by becoming globally recognized as leaders in the knowledge based economy. If executed successfully, this could become an essential model from which future VIS communities are built and improve the organizations' reputations in the global community as leaders of innovation.

In terms of the research community, there are two important potential implications of this research. First, we believe that it is essential to make the academic community more aware of the current developments in terms of 3-D web usage and design. Second Life represents the future of the online experience and poses many interesting new applications for research as well as for education. Imagine a lecture hall where your avatar conducts a class in front of other avatars, regardless of geographic location. In Second Life, we are able to research and experiment with different styles of social interactions, group dynamics and teamwork in a way not possible in the real world.

Additionally, while the importance of innovation is universally understood, how innovation actually evolves is still essentially considered a black box. Despite the focus on knowledge, learning and innovation in the literature, much work remains to be done on examining and comparing knowledge producing practices within and between firms. While ongoing innovation is seen as crucial in all sectors, and the explicit management of innovation has become a key concern of firms, little is still understood about how such activities are actually organized in practice and of the extent of the variation within and across firms, in both local and international contexts (Dosi 1999). An understanding of these practices, in all their variety, is an essential prerequisite to discussing innovation systems at national/regional or international levels. Fundamental to this analysis is an appreciation of the tacit and situated nature of knowledge (Lave and Wenger 1991), and the difficulties associated with 'transferring' or 'sharing' it (Brown and Duguid 2001).

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